and so on to 0, which means that there is not the slightest probability of a rainfall in a given area during a time interval for which the prediction is made. The symbols 8-4 would thus mean that the chances are 8 to 2 in favor of rain and that the total precipitation would be about 0.4 of the maximum. The symbols 2-9 would indicate that the chances are only 2 to 8 in favor of rain and that a heavy precipitation might be expected in case the storm reached the given area. Less accurately, a heavy precipitation with an approach to certainty is indicated when both targets occupy the upper third of the diagram; an average precipitation with about an even chance of its occurrence would be represented by both targets in the middle third; while uncertain weather conditions and light showers would be represented by both targets in the lower third. The left target near the bottom and the right one near the top would indicate a severe storm not far distant, either passing or approaching; while the left target near the top and the right one near the bottom would mean that the probability of light showers is almost unity. The system of nomenclature would not therefore be unintelligible to persons unfamiliar with the theory of probabilities and the ease with which the predictions could be distributed in rural districts by means of the telephone, or exhibited on the streets and elsewhere by means of simple mechanical devices, is suggestive of its usefulness in these respects. Furthermore, the publication of the numbers with the usual forecasts would give additional and precise information not easily expressed in a few words.

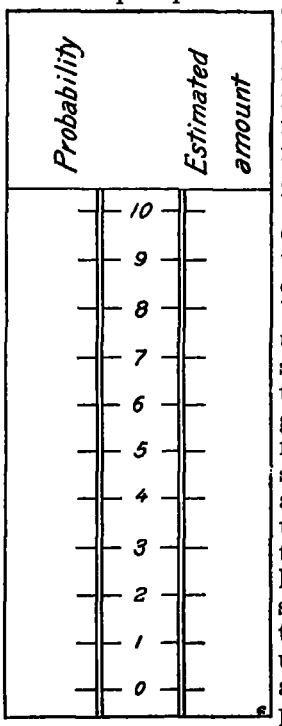

FIG. 1.—Forecast scale, Van Orstrand.

For the most part, the first column may be said to represent the forecaster's estimate of the storm's rate of approach, or, in general, it is the weight which he assigns to the predicted phenomena; and the second column is his estimate of the magnitude or intensity of the predicted phenomena, such as amount of rainfall, temperature conditions, wind velocity, percentage cloudiness, etc. Were meteorology an exact science, the first column, or number, would not be needed, and the numbers in the second column could be foretold to a fair degree of precision for comparatively long intervals of time. Until this stage in the development of the science of meteorology is reached, the more nearly the predictions can be stated in terms of probabilities, the more nearly will meteorologists be able to interpret the various weather conditions, for the benefit of the public, in strict accordance with scientific principles.

COMMENT BY PROF. H. C. FRANKENFIELD.

Doctor Van Orstrand's scheme is very similar to, although somewhat more elaborate than that devised and put into operation in 1905 by W. Ernest Cooke, Esq., Government Astronomer for Western Australia. That scheme was commented on by Prof. E. B. Garriott.[1]

In my opinion both schemes are defective in that while aiming to avoid positive statements (as a rule) in weather forecasts, they fall into exactly the difficulty they are attempting to avoid. There are but three possibilities on the weather chart, as follows:

1. There will be precipitation within a given period.
2. There will not be precipitation within a given period.
3. It is doubtful whether or not there will be precipitation within a given period.

In the present state of our meteorological knowledge any elaboration of these three possibilities will tend only to confuse the situation, and to necessitate attempts at precision beyond the ability of the forecaster with the material at hand. If there is doubt in his mind, it is useless to attempt to qualify it.

The second proposition of Doctor Van Orstrand relative to forecasts of the intensity or quantity of precipitation is open to still greater objections. Logical forecasts of the quantity of precipitation are absolutely impossible, except with two types of storms. In one of these two types the depression moves down the western slope of the Rocky Mountains into western Texas, and then recurves northeastward through the Ohio Valley. In the other type the depression moves from the Pacific Ocean through Mexico into Texas, and thence northeastward. Both these types are attended by heavy rains or snows about 95 per cent of the time. From all other storm types the quantity of precipitation will vary from practically nothing to a number of inches. The solution of the problem depends upon a knowledge of conditions that are not now apparent on the weather chart, and some of this knowledge,at least, we have well-founded hopes of obtaining in the future through a systematic investigation and discussion of the phenomena of the upper atmosphere.

[1] Monthly Weather Review, January, 1906, 34:23-24.

A METHOD OF ADVERTISING CLIMATE.

By FORD A. CARPENTER, Local Forecaster. Dated San Diego, Cal., May 8, 1909.

It is difficult to advertise a climate properly, for statistical tables, columns of figures and weather charts may be ever so carefully compiled and attractively labelled, but the general public balk at tables and charts. The Board of Supervisors of the county of San Diego, Cal., provided the necessary funds to prepare an attractive and practical method of showing features of the climate of San Diego at the Alaska-Yukon-Pacific Exposition at Seattle, Wash.

The San Diego climatic exhibit consists of three pieces of apparatus. To show the cool summers and the warm winters of San Diego an electric-flasher-board has been designed. This consists of a sign 7 feet high and 8 feet long, having vertical lines and horizontal divisions showing the months of the year, and temperatures from 30° to 90°. A row of red electric lights outlines the maximum temperature for every month of the year, and a row of blue electric lights the minimum temperature for the corresponding period. Beginning with January, the red lights burn consecutively, two lights foreach month until the whole year's monthly maximum temperatures are displayed. The illuminated trace requires about 10 seconds to traverse the 12 months. These lights then disappear, and a line of blue lights is begun on the minimum portion of the board. When the line of blue lights is complete, showing the lowest point the thermometer touched in each month, the red and the blue lines are exhibited simultaneously for 10 seconds. Immediately afterwards the red line of lights again begins its trace over the sign, and is again followed by the blue line, and so on as long as the current flows.

To show the current daily maximum temperature in San Diego during the summer of the exposition, there is a representation of a thermometer 7 feet high. Red lights serve to make each 10-degrees point on its scale, and a movable hand, studded with small white lamps, points to the highest temperature at San Diego for the preceding day as officially reported by the local Weather Bureau office at Seattle.

The third piece shows the cool summers and the warm winters of San Diego. The countries of the earth are outlined in color on the inside of a ground glass globe 24 inches in diameter and illuminated by a lamp at its center. On the surface of the globe red and blue lines show the July and January positions respectively of the 50°, 60°, and 70° isotherms for the whole

northern Hemisphere. While most of the countries are labelled, there appears the name of but one city, that of San Diego. The globe is made to revolve slowly by a motor concealed in the base of the supporting cabinet. A careful study of this brilliantly illuminated globe shows the relation of San Diego's climate to that of other parts of the earth. The spectator sees at once that the courses of the summer isotherms between which San Diego lies, also enclose Alaska and Siberia, while the winter courses in blue embrace San Diego as well as portions of Arabia and Egypt.

It would seem practicable to apply some of these methods of attracting attention to more serious purposes than advertising. This would appear to be especially true of the illuminated and revolving globe. The boundaries of the countries of the world, the seas, islands and their designations are painted[1] on the inside of the globe. Such a method allows complete isothermal and other lines as well as the distribution of winds and rainfall to be drawn in water colors on the outside of the glass. Such drawings could be easily erased or changed.

That the general public are interested and study such a climatic display was shown by the results of the preliminary display made in one of the prominent store windows before shipment to Seattle. Several thousand people saw this exhibit during the three days it was shown at San Diego.

TORNADO AT SAVANNAH, GA.

By H. B. BOYER, Local Forecaster. Dated Savannah, Ga., May 31, 1909.

The most notable feature of the month's weather at Savannah, Ga., was a tornado that struck the city May 1, and swept over the southern and eastern portions. The path was nearly northeast and plainly marked by wrecked buildings, uprooted trees and débris along its entire course through the city. The tornado struck the city at about 11 a. m. and its time of passage across the city was less than two minutes. Its approach was so sudden that people in its path were given absolutely no warning, and before they were aware of what had happened the storm was out of sight.

The tornado followed immediately after an unusually heavy rainfall with severe lightning, and must have originated near the southern limits of the city, as no report of its existence has been received from the surrounding country and no débris was observed in the rotating cloud as it approached the city. An eye-witness describes the cloud as intensely blue-black when first observed, at an elevation of about 400 feet, and not rotating visibly. As it approached the city the cloud lowered and its counter-clockwise rotation became plainly visible. At the point of first damage the tip of the funnel was about 5 feet above the roofs of the Savannah Lumber Company, which sustained some slight damage. From here it lowered until 100 yards farther on its full force struck and wrecked a 4-storied concrete building, entirely removing the top floor. After this witnesses state that the whirling cloud rotated counter-clockwise, was filled with wreckage and intensely black. An apartment house which was destroyed seems to have been exploded. Near Kehoe's Iron Works the cloud passed over a shed opening a hole 6 feet in diameter through the roof very much as though a large cannon had been fired upward through it. After leaving the city the cloud was visible for probably 30 seconds, when all traces of it were lost and no reports of it were received from anywhere in this vicinity.

In an open place near the point of greatest severity of the storm the débris was arranged spirally about the center of the path, the greater portion being on the right side. The greater amount of damage seems also to have occurred on the right-hand side of the advancing storm. The width of the path of maximum destruction was about 200 yards and the longest stretch over which the point of the funnel was in contact with the ground was about 1,500 feet. A block of concrete, weighing about 300 pounds, was carried 3,000 feet. One death, due to injuries received, resulted from this tornado.

The tornado was preceded by severe lightning. Except for a slight oscillation recorded by the barograph and the excessive rainfall, the station instruments gave no indications of a severe storm, and the first news of it reached us by telephone.

[1]A neater and perhaps more satisfactory device for showing geographical boundaries, seas, etc., is suggested by the advertisement of one of the great steamship companies. In this case the excellent projection and map of the D. Riemer globe is glued to the outside (better *inside*) of an almost perfect globe of the proper dimensions, which is illuminated from within and revolved by motor.—*C. A., jr.*

METEOROLOGY AT COLBY COLLEGE.

By Prof. H. E. SIMPSON, University of North Dakota. Dated Waterville, Me., April 9, 1909.

Meteorology has been given as a specific course in the curriculum of Colby College for four years. Previous to this the study of the atmosphere held a relatively large place in a general course in physical geography since the introduction of this subject in 1891. The course occupies one semester and is open to sophomores and juniors, from twenty to forty of whom elect it each year.

The work consists of lectures, recitations and laboratory exercises. The lectures are generally informal and are combined with recitation and class discussion, Davis's Elementary Meteorology serving as a text. Other texts, especially those of Waldo and Russell and the reports of the United States Weather Bureau, are freely used for reference. The class exercises are frequently illustrated with the lantern, for which the collection of photographs, charts, graphs and maps prepared by the Geographic Society of Chicago[1] has been found most helpful. A few slides are used to illustrate almost every lecture and recitation. Occasionally, as in the study of clouds, a large number of photographic slides are used in a single hour.

One 2-hour period per week is devoted to practical laboratory work. This includes non-instrumental weather observations, observations by means of standard meteorological instruments and the correction of observed readings, the construction of weather charts and maps, and weather forecasting. The instrumental equipment includes the complete equipment for cooperative observers of the United States Weather Bureau, together with the barometer, the hygrometer, psychrometer, etc. No attempt is made to secure standard observations for continuous record, since a regular cooperative station of the United States Weather Bureau is located at the Hollingsworth and Whitney Paper Mills on the opposite side of the Kennebec River at Winslow, Me.

In the laboratory as well as in the classroom the lantern is a most valuable aid, especially in the study of type series of weather maps and in forecasting. A few illustrations of our method may be of interest. In the study of the progression of low-pressure areas across the United States, instead of each student working on a separate and indifferent series of original weather maps, a group of slides or even a single "quad" slide, showing a selected series, is used. From these each student may note at once the various changes from day to day and record the essential features on a blank map previously given out by the instructor, and draw his individual conclusions and express them, in writing or orally, as desired. By this method less time is taken, less explanation is required, less confusion is made, and better results are obtained than by the old method.

In forecasting, an excellent exercise consists in basing predictions on one map shown on the screen and then verifying the predictions by showing the actual weather conditions of the day following. The changes of the last twenty-four hours and the conditions shown may then be used to forecast the weather for the next day, and so on for an entire week.

The study of the veering and backing of the winds caused by the passage of a cyclone may be exhibited in a very real-

[1] See J. P. Goode: The use of the lantern in teaching meteorology. Monthly Weather Review, June, 1906, 34:263.